

### A.3.7 DRAFT - LIVING WITH A STAR (LWS) TARGETED RESEARCH AND TECHNOLOGY

#### NOTICE

The following material is a DRAFT of the Living With a Star Targeted Research and Technology (LWS TR&T) program that is expected to be posted in final form in the April 2003 timeframe after the TR&T Definition Team Report is finalized. Until that time, questions or comments may be directed to the LWS Program Officer identified in Section 2 below.

#### 1. Scope of Program

The goal of the Sun Earth Connection (SEC) Living With a Star (LWS) program is to develop the scientific understanding necessary to enable the U.S. to effectively address those aspects of the connected Sun-Earth system that affect life and society. To answer these questions, this LWS Targeted Research and Technology (TR&T) program element solicits proposals that provide both physics-based understanding, as well as experimental measurements to test our knowledge of the Sun-Heliosphere-Earth system. This objective can be achieved by exploiting data from past and present space missions for scientific analysis, theory, and modeling efforts, as well as technology improvements that contribute to operational answers concerning specific areas relevant to societal needs. LWS is recognized as a cross-cutting initiative whose goals and objectives relate to all five of NASA's Strategic Enterprises, namely (and in no priority order):

- Space Science - LWS seeks to quantify the physics, dynamics, and behavior of the Sun-Earth system over the 11-year solar cycle;
- Earth Science - LWS pursues improving our understanding of the effects of solar variability and disturbances on terrestrial climate change;
- Human Exploration and Development of Space- LWS develops knowledge of advanced warning capabilities of solar energetic particles that may affect the safety of humans in space;
- Aerospace Technology - LWS seeks further detailed characterization of the radiation environments useful for the design of more reliable electronic subsystems for air and space transportation systems; and
- Biological and Physical Research – LWS helps define the space environment in which living systems must exist if space beyond the Earth's magnetosphere is to be explored by humans.

The LWS TR&T component is designed to support individual targeted research tasks that employ a variety of research techniques in pursuit of LWS program goals and may involve the analysis of data from past and present NASA spacecraft or data from other nations and agencies that are in the public domain. Specifically, the LWS TR&T program addresses five objectives:

- *Scientific Understanding*

Theoretical research, the development of models and simulations, and the analysis and interpretation of data for the purposes of identifying and understanding the physical processes important to Sun-Heliosphere-Earth system, which also includes boundaries and coupling among systems and phenomena (e.g., solar atmosphere/heliosphere, heliosphere/-magnetosphere, magnetosphere/ionosphere etc.).

- *Empirical Tools*

Development of new empirical techniques and models for the origin and propagation of solar, interplanetary, and geospace disturbances that provide improved predictive tools that can be used to mitigate harmful effects on human technologies (e.g., the discovery of a signature in soft X-ray images of solar regions that indicates a high probability for coronal mass ejections (CME's), or models of the near real-time latitudinal cut-off of solar energetic particles using spacecraft data). Note: Development of new techniques for accessing and analyzing data used in LWS research, especially software that enables the combining of data from different sources, instruments and models, and across LWS disciplines (note: such software must be made publicly accessible).

- *Understanding Terrestrial Climate*

Enhancement of the understanding of the role of solar influences in affecting terrestrial global climate, especially stressing new research investigations that make use of data from past or current space missions and/or support past, current, or possible future space missions, including investigations involving theory, modeling, and historical data on the connections between the behavior of the Sun and climate.

- *Characterization of Space Climate*

Improvement of our scientific knowledge of space environment conditions and variations over the solar cycle (e.g., enabling cost-effective design of scientific spacecraft and subsystems to minimize space environmental effects and damage); and development of cost-effective techniques for assimilating data from networks of research spacecraft.

Specific suggestions of space science areas of concern may be found in the following documents:

- the National Academy of Sciences Web tutorial, entitled “*Space Weather: A Research Perspective*” (<http://www.nas.edu/ssb/cover.html>);
- the report on the Solar Influences Workshop (<http://www.ispe.arizona.edu/research/sunclimate/>);
- the Sun Earth Connection LWS WWW site (<http://lws.gsfc.nasa.gov/>);

- the LWS Science Architecture Team report to SECAS ([http://lws.gsfc.nasa.gov/docs/LWSSAT\\_SECASreport\\_30Aug01.pdf](http://lws.gsfc.nasa.gov/docs/LWSSAT_SECASreport_30Aug01.pdf));
- material from the LWS Mission Requirements Workshop material ([http://lws.gsfc.nasa.gov/lws\\_presentations.htm](http://lws.gsfc.nasa.gov/lws_presentations.htm));
- the Sun-Earth Connection Roadmap report ([http://sec.gsfc.nasa.gov/sec\\_2002\\_roadmap.pdf](http://sec.gsfc.nasa.gov/sec_2002_roadmap.pdf));
- the Geospace Mission Definition Team Report (<http://lws.gsfc.nasa.gov/docs/Geospace/GMDTReportforWeb.pdf>); and
- the NRC Decadal Survey Report (<http://www.nationalacademies.org/ssb/sspsuntoearth.html>).

The Living With a Star data policy calls for complete and immediate access to all data from LWS missions. Therefore, proposals that promise prompt public access to LWS TR&T data and products is an important objective in the evaluation of submitted proposals. With respect to the development of computer programs, especially appropriate are proposals for those that are or will be demonstrably available in the public domain.

Note that to enable the NASA Office of Space Science to properly evaluate the relevance of proposals submitted to its programs, as well as track its progress towards achieving its goals as mandated by the Government Performance Review Act (GPRA), all research supported by NASA's programs must now demonstrate its relationship to NASA Goals and Research Focus Area's (RFA's) as stated in the latest version of its Strategic Plan (follow links from the Web site <http://spacescience.nasa.gov/>); see also the discussion in Section 1 of the *Summary of Solicitation* of this NRA. Therefore, all proposers to this program element are asked to state their perception of this relevance in terms of the Goals, Science Objectives, and RFA's given in Table 3 found in the *Summary of Solicitation*. In particular, this program element is designed to help fulfill all of the RFA's for the Science Objective 1 for both Goals I or II of the Sun-Earth Connection science theme. The appropriate place for this statement of relevancy is in the introduction to the proposal's "Scientific/Technical/Management" section (see Section 2.3.5 in the *Guidebook for Proposers*). The index numbers in this table may be used to identify a specific RFA, for example, "Goal I, Sun-Earth Connection Theme, RFA 1(c)" or "Goal II, Astronomical Search for Origins, RFA 3(b)."

## 2. Programmatic Information

Given the unique aspects of the LWS TR&T objectives, reviewers of submitted proposals will include knowledgeable representatives of the LWS customer community, as well as peer scientists. The evaluation of the intrinsic merit of LWS TR&T proposals will include consideration of the significance of, and evidence for, tangible advance in achieving at least one of the five primary objectives of the LWS program given in Section 1 above. Since expeditious impact from LWS TR&T is desirable, proposals that promise and can support with a convincing methodology that significant results are possible in the near term are particularly appropriate and encouraged.

To aid in the identification of reviewers, it is essential that the electronically submitted *Cover Page* for LWS TR&T proposals (see further below) include a single choice of discipline descriptor (e.g., G for Geospace and S for Solar & Heliospheric clusters) and the relevant program objective.

An annual call for proposals for LWS TR&T investigations is now planned for the foreseeable future. The total funding available for new proposals submitted through this NRA and to be funded in Fiscal Year (FY) 2003 is expected to about \$6M. Proposals for efforts up to three-years duration are solicited. To give perspective for the number of proposals that may be funded through this program, the average first year value of the selected awards made through the ROSS – 2000 NRA was ~\$90K, which does not necessarily exclude funding of larger awards for programs of exceptional merit and breadth.

### IMPORTANT INFORMATION

- As discussed in the *Summary of Solicitation* of this NRA, the Office of Space Science (OSS) now uses a unified set of instructions for the preparation and submission of proposals given in the document entitled *NASA Guidebook for Proposers Responding to NASA Research Announcement - 2003* (or *NASA Guidebook for Proposers* for short) that may be accessed by opening <http://research.hq.nasa.gov/> and linking through "Helpful References," or by direct access at <http://www.hq.nasa.gov/office/procurement/nraguidebook/> (note that the updated 2003-edition of the *Guidebook* is used for this solicitation).
- Section 6 of this NRA's *Summary of Solicitation* contains the Web address relevant to the electronic submission of a Notice of Intent (NOI) to propose and a proposal's *Cover Page/Proposal Summary/Budget Summary*, as well as the mailing address for the submission of the hard copies of a proposal.

Questions about this program element may be directed to the LWS Program Officer:

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